

UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Combat Service Support Schools
Training Command
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LVSM 7210

STUDENT OUTLINE

MAINTAIN THE LVS MECHANICAL STEERING SYSTEM

LEARNING OBJECTIVES:

1. Terminal Learning Objective: Given an LVS, TM 2320-20/12A, TM 2320-34/13A, tools, and equipment, perform second echelon maintenance on the LVS hydraulic steering system, per the references. (3521.13.21)
2. Enabling Learning Objectives:
 - a. Given an LVS, TM 2320-20/12A, tools, and equipment, inspect the mechanical steering system components for serviceability, per the references. (3521.13.21a)
 - b. Given TM 2320-20/12A and partial statements pertaining to the LVS mechanical steering system, complete the partial statements to describe the procedures used to diagnose a malfunctioning mechanical steering system, per the reference. (3521.13.21b)
 - c. Given an LVS, TM 2320-20/12A, tools, and equipment, test the mechanical steering system, per the reference. (3521.13.21c)
 - d. Given an LVS, TM 2320-20/12A, tools, and equipment, repair the mechanical steering system, per the reference. (3521.13.21d)
 - e. Given an LVS, TM 2320-20/12A, tools, and equipment, adjust the mechanical steering system, per the reference. (3521.13.21e)

OUTLINE

1. IDENTIFICATION, LOCATION AND FUNCTION OF THE COMPONENTS EMPLOYED IN THE LVS STEERING SYSTEM

- a. The steering gear incorporated in the MK48 is of the conventional power-assist type. The steering gear is connected to the bellcrank by a

pitman arm and a drag link. The bellcrank coordinates the steering action of the front axle with two double-acting yaw cylinders, using a yaw control valve and a mechanical feedback linkage. Hydraulic pressure for the steering system is provided by an engine driven pump through flow control valves. The following components are included in the steering system of the MK48.

(1) Steering wheel. The steering wheel is used to rotate the steering shafts.

(2) Ninety degree gear boxes. There are two, 90 degree gear boxes, which are used to change the direction of the rotating steering shafts.

(3) Steering shafts. The steering shafts provide a mechanical means of transmitting the rotating action of the steering wheel to the steering gear boxes. The shafts contain universal joints that allow for the different angles of the components.

(4) Steering gear. The steering gear provides full-time hydraulic assisted, power steering. The steering gear hydraulically multiplies the torque from the steering wheel to the pitman arm.

(5) Pitman arm. The pitman arm transfers the steering gear torque to the upper drag link.

(6) Upper and lower drag link. The drag links connect the steering gear and the steering arm to the bellcrank.

(7) Bellcrank. The bellcrank pivots on a frame mount and serves two purposes.

(a) The first purpose is to transmit the movement from the upper drag link to the lower drag link.

(b) The second purpose is to provide a mounting bracket for the yaw control valve.

(8) Yaw control valve. The yaw control valve is mechanically linked to the steering gear through the upper drag link and bellcrank. The yaw control valve instantly senses movement of the bellcrank. This tells the motion control valve which way the vehicle is turning and also signals the motion control valve when to stop turning.

(9) Spring Fuse Link. The spring fuse link coordinates the steering action between the yaw cylinders and the front axle. The fuse link is threaded into the yaw control valve at one end and is connected to the feedback linkage at the other end. The spring inside the fuse link retains

the force necessary to signal the yaw control valve to send oil or stop oil flow to the motion control valve. The fuse link also works to prevent trailer wander by activating the steering valve, which corrects the MK48 and rear trailer unit alinement.

(10) Yaw feedback linkage. The feedback linkage provides a means of transmitting the position of the articulation joint in relationship to the direction of the vehicle. A bracket mounted over the center of the articulation joint is connected by a linkage rod to a yaw bellcrank. When the bracket and linkage rod move, it will pivot the bellcrank, moving the spring fuse link and activating the yaw control valve.

(11) Motion control valve. The motion control valve directs the hydraulic oil to the correct end of the yaw control cylinders. This valve and the yaw cylinders will be discussed in greater detail during the next lesson.

2. PRINCIPLES OF OPERATION OF THE MK48 STEERING SYSTEM

a. The driver of the MK48 is positioned ahead of the power steering gear and the front axle. A left or right turn is accomplished by turning the steering wheel in the desired direction. This action is transferred through the steering column to the cab mounted 90 degree gear box. A 90 degree gear box uses bevel gears to change the direction of the frame mounted 90 degree gear box by a short steering shaft and two universal joints. The frame mounted 90 degree gear box transmits the turning action rearward through the long steering shaft. The long steering shaft is connected to the power steering gear.

b. As the steering gear actuating shaft is turned, the actuating valve moves, allowing high oil pressure to move the piston. As the piston moves, the rack gear slides and rotates the pinion gear and the output shaft. This rotation of the output shaft causes the pitman arm and upper drag link to move.

(1) When the vehicle is in the straight ahead position, a spool-type actuating valve is centered, allowing a constant oil flow through the steering gear.

(2) When the actuating shaft is turned, it moves the actuating valve off center. This permits high pressure oil to build up at the end of the piston, moving it in the bore of the steering gear housing. A rack gear is machined into one side of the piston. As the piston moves, the rack gear slides and rotates the pinion gear and output shaft.

(3) When the movement of the actuating valve stops, reversing springs at the end of the valve center the valve, relieving the high pressure oil at one end of the valve.

(4) Relief valve plungers are provided at both ends of the steering gear. They will automatically unload the high pressure oil if the wheels are turned against the pitman arm stops.

c. As the upper drag link moves, the bellcrank pivots on its frame mount. The bellcrank movement is then transmitted through the lower drag link to the steering arm. The steering arm moves the No. 1 axle's ball socket and tie rod arm, which turns the wheels at the same time by way of the tie rod.

d. Something very unique to the MK48 steering starts back at the bellcrank. Attached to the bellcrank is the yaw control valve. As the bellcrank moves, the spool valve slides off center, allowing hydraulic oil to signal the motion control valve. Depending on which way the vehicle is turned, the oil is then routed through the motion control valve and to the yaw cylinders. As one of the yaw cylinder extends, the other one will retract, which will pivot the articulation joint in the opposite direction the driver is turning.

e. A bracket mounted over the center of the articulation joint is connected to the yaw feedback linkage, which is connected to the spring fuse link. The spring fuse link will then coordinate the steering action between the yaw cylinders and the front axle. The spring within the fuse link cylinder retains the force necessary to signal the yaw control valve to send or stop oil flow to the motion control valve.

3. ORGANIZATIONAL MAINTENANCE RESPONSIBILITIES FOR THE MK48 STEERING SYSTEM

a. The organizational mechanic is responsible for replacing all of the steering components except the steering gear and the steering arm.

b. The organizational maintenance mechanic is also responsible for the inspection, adjustment and repair of the:

- (1) upper and lower drag link,
- (2) tie rod,
- (3) steering gear,
- (4) bellcrank, and

(5) feedback linkage.

c. The organizational maintenance mechanic is also responsible for the inspection and repair of the spring fuse link, the steering shafts, and the steering column and for inspection of the steering gear.

4. REPAIR OF THE STEERING COLUMN

a. Inspection of the Steering Column

(1) First, grasp the steering wheel and check to see if it is mounted securely to the steering shaft.

(2) Next, check for proper operation of the horn switch. Inspect the switch housing for looseness or cracks.

(3) Check for looseness or binding of the steering shaft and bushings.

(4) Inspect the jacket tube for cracks or damage.

(5) Check the column mounting caps and capscrews for cracks, looseness or stripped threads. Also, look for cut or worn rubber pads between the column caps.

b. Removal of the Steering Wheel

(1) Turn the steering wheel so the vehicle is in the straight ahead position.

(2) Now, disconnect the batteries.

(3) While depressing the horn button, turn the button 1/4 of a turn counterclockwise. Remove the horn button, cup and spring.

(4) Next, remove the base plate and note the position of the short and long screws.

(5) Remove the nut from the steering shaft and, using a wheel puller, remove the steering wheel.

(6) Note the position of the two screws on the underside of the steering wheel. Remove the two screws and the contact plate.

c. Removal of the Steering Column

(1) Before you start to remove the column, you must open the front instrument panel to expose the wiring harness. You do not need to remove the panel from the vehicle.

(2) Now, you must remove the turn signal switch from the steering column.

(3) Next, disconnect the horn wire from under the dash and separate the wire from the turn signal switch harness.

(4) After those steps are completed, go to the end yoke on the column and remove the capscrew and locknut.

(5) Next, remove the column caps and rubber pads by removing the two capscrews and lockwashers that secure them to the steering column brace.

(6) Lift the column out of the end yoke. It may be necessary to spread the end yoke slightly to ease removal.

d. Repair the Steering Column

(1) First, slide the spacer and upper spring seat from the switch housing.

(2) Next, remove the dust cap, lower spring, and spring seat from the jacket tube.

(3) Slide the steering shaft out of the jacket tube.

(4) Tapping on the outer shell only, remove the lower bearing from the jacket tube.

(5) Slide the protective wrap off the horn wire assembly. While feeding the horn wire assembly into the column, carefully pull the horn contact from the switch housing. Then remove the horn contact and wire assembly completely.

(6) From inside the switch housing, pry the locking tabs on the jacket tube back enough to allow the removal of the switch housing.

(7) Turn the switch housing steering wheel side down and using a press, remove the upper bearing by pressing against the bearing shell only.

(8) To assemble the steering column, you first place the switch housing in the press, steering wheel side up. Install the upper bearing, pressing against the outer bearing shell only.

(9) Next, slip the housing onto the jacket tube and bend the jacket tube locking tabs to secure it to the switch housing.

(10) Feed the terminal end of the horn wire assembly through the switch housing, exiting the opening provided on the side of the jacket tube. Push the horn contact firmly into the switch housing and reinstall the protective wrap over the horn wire assembly.

(11) Now, install the lower bearing shell into the bottom of the jacket tube, applying pressure to the outer bearing shell only.

(12) Lightly coat the steering shaft with grease and install the steering shaft through the jacket tube and switch housing.

(13) Slide the spring seat, spring, and dust cap over the steering shaft, into the lower bearing.

(14) Place the upper spring seat and spacer into the switch housing, over the steering shaft.

e. Replace the Steering Column

(1) First, insert the splined end of the column into the end yoke.

(2) Next, place the two rubber pad halves between the column and the two column caps. Holding the column caps and the pads in place against the bottom side of the column braces, insert the two capscrews, lockwashers, and hex nuts. Check the alignment of the rubber pads, then tighten the capscrew and hex nuts securely.

(3) Now, install the capscrew and a new locknut through the end yoke and tighten them securely.

(4) Position the turn signal switch on the column and tighten the band clamp around the column. Reconnect the horn wire under the dash and secure the wire to the turn signal switch harness.

f. Replace the Steering Wheel

(1) First, secure the contact plate with two screws in their proper location on the underside of the steering wheel.

(2) Next, align the steering wheel and the steering shaft splines for a straight ahead position and install the steering shaft nut and tighten it securely.

(3) Place the base plate into the switch housing and install the two short screws and one long screw in their proper positions.

(4) Set the spring and cup over the end of the steering shaft and replace the horn button with a downward and clockwise motion.

(5) Reconnect the batteries and check the operation of the horn and steering column.

5. REPAIR OF THE STEERING SHAFT ASSEMBLY

a. Inspection of the Steering Shaft Assembly

(1) Check the two U-joint assemblies at the 90 degree gear box mounted under the dash for looseness, breaks, cracks, rust, or wear.

(2) While under the dash, inspect the steering shaft support bearing and the visible portion of the steering shaft for looseness, wear, breaks or cracks.

(3) From under the vehicle, look for looseness, breaks, cracks, rust, or wear on the two U-joints at the 90 degree gear box mounted on the frame.

(4) Following the steering shaft rearward to the power steering gear, look for cracks, bends, looseness, rust, or wear in the steering splined shaft and the U-joint at the power steering gear.

b. Removal of the Steering Shafts and U-joints Assembly

(1) Before removal of the short steering shaft connecting the two 90 degree steering boxes, one or both 90 degree steering boxes must be removed.

(2) Remove the capscrew and locking nut, which secures the U-joints to the short steering shaft. Spread the U-joints slightly and remove them from the shaft. Also, remove the two keys from the shaft.

(3) To disassemble the U-joints, remove the four snap rings from the bearing caps. Remove the four bearing caps and the lube fitting from the universal joint. Check the bearing caps and universal joint for rust, wear, breaks, or cracks.

(4) With the help of an assistant holding the nuts, remove the three capscrews, lockwashers, and nuts holding the support bearing to the side panel. Now, the short steering shaft and support bearing can be removed from inside of the vehicle.

(5) Separate and remove the two bearing support flange halves and remove the bearing from the steering shaft. Inspect the steering shaft bearing surface area for rust, cracks, or wear. Also, check the bearing and flange halves for rust, cracks, binding, or wear.

(6) Remove the capscrew and locknut from the end yokes of the long steering shaft going from the 90 degree gear box to the power steering gear.

(7) Slightly spread the splined end yoke at the power steering gear and slide it into the steering shaft. Slightly spread the end yoke at the 90 degree gear box shaft and remove the long steering shaft from the vehicle.

(8) Remove the lube fitting from the steering shaft. Next, slide the end yoke and splined shaft out of the steering shaft. Pry the tabs of the dust cover up and remove the dust cover along with the gasket. Check the dust cover and gasket for wear, cracks or damage.

(9) Disassembly of the long steering shaft U-joints is the same as the short steering shaft.

(10) Inspect the splined shaft, both universal joints and their bearing caps for cracks, breaks, rust, or wear.

c. Replacement of the Steering Shaft and U-Joint Assembly

(1) Install the lube fitting into the universal joint. All three lube fittings should face the same direction for ease of lubrication. Install the bearing caps and keyed yoke end onto the steering shaft and place a snap ring on each of the bearing caps, making sure the snap rings are seated into the grooves of the bearings caps.

(2) Place the gasket into the dust cover and install the dust cover with the gasket onto the splined shaft end of the steering shaft. Secure the tabs of the dust cover to the steering shaft.

(3) Install the universal joint lube fittings, bearing caps, and snap rings into the splined shaft and splined end yoke. Spread a light film of grease over the splined shaft and install the splined shaft into the steering shaft. Install the lube fitting into the steering shaft.

(4) Slide the splined end yoke onto the power steering gear shaft and install the clamping capscrew and locknut.

(5) If the frame mounted 90 degree gear box is in place, aline the end yoke keyway with the key in the 90 degree gear box shaft. Slide the end yoke onto the shaft and secure the yoke with a clamping capscrew and locknut.

(6) Lubricate both U-joints and the steering shaft, following the instructions in the lubrication instruction.

(7) To reassemble the short steering shaft, first lightly coat the bearing surface area of the shaft with a film of grease. Slide the support bearing with a support bearing flange on either side onto the steering shaft and install a key in both ends of the shaft.

(8) It is necessary to have one or both 90 degree gear boxes removed before installing the short steering shaft. From inside the cab, slide the shaft through the hole in the side panel. Both flange halves should be on the inside of the cab.

(9) Aline the holes in the flange halves and the holes in the side panel. With the help of an assistant, install three capscrews, nuts, and lockwashers that secure the support bearing assembly to the side panel.

(10) Install the four bearing caps onto the universal yokes and the universal joint. Securely install the snap rings over the bearing caps and install the lubrication fitting.

(11) Aline the slot in the universal yoke with the key in the steering shaft or 90 degree gear box shaft. Slide the universal assembly in place and secure the shaft with the capscrews and locking nuts.

6. REPAIR OF THE DRAG LINK

a. Inspection of the Drag Link. The upper and lower drag links are inspected in the same manner.

(1) Make sure the mounting castle nuts are secure and the cotter pins are in place.

(2) Next, check the drag link end dust seals for tears, cracks, or damage. Also, be sure that the lubrication fittings are not damaged or missing.

(3) The last step is to inspect the drag link tube for cracks, breaks, bends, or damage.

b. Repair of the Drag Link. The upper and lower drag links are repaired in the same manner.

(1) For easier access to the drag links, remove the left front tire.

(2) Now, remove the cotter pins and castle nuts securing the adjustable and the permanent drag link ends. If any of the castle nuts were loose, inspect the stud and the tapered mounting hole for out-of-roundness. Remove the drag link from the vehicle by installing the drag link removal tool between the drag link end and the mounting area striking the tool with a hammer.

(3) Disassemble the capscrew, locknut, and clamp from the adjustable end of the drag link. Check the capscrew and clamp for cracks, breaks, or damage.

(4) Turning the adjustable drag link end counterclockwise, remove the end from the drag link. Inspect the drag link end for cracks, breaks, or damaged threads.

(5) With the socket of the adjustable drag link end supported, there should be very little or no vertical movement of the stud. If movement is detected, replace the socket assembly.

(6) Make sure the permanently staked drag link end is tight within the drag link tube. Inspect the drag link end for any cracks, breaks, or damage.

(7) Supporting the socket of the permanently mounted drag link end, check for vertical end movement of the stud. If vertical movement is detected, replace the drag link.

(8) Install the clamp, capscrew, and locknut. Do not tighten the locknut at this time. Thread the adjustable drag link end into the drag link.

(9) The upper and lower drag links should be adjusted to the proper length before installation. Proper length adjustment is accomplished by turning the adjustable drag link end in or out. The length of the upper drag link must be 30 inches. The length of the lower drag link must be 28 inches. The measurement for both drag links is taken from the center of one socket assembly to the center of the other socket assembly.

(10) When installing the upper drag link on the vehicle, mount the adjustable drag link end to the pitman arm, with the stud pointed toward the power steering gear. The permanent drag link end goes to the top mounting position of the bellcrank, with the stud pointing away from the vehicle. Install the two castle nuts and torque the permanent socket nuts to 110 to 125 foot-pounds and the adjustable socket nut to 90 to 100 foot-pounds. Install the cotter pin through the holes in the socket assembly. If the holes do not line up, tighten the castle nuts.

(11) Next, place the adjustable drag link end of the lower drag link into the steering arm with the stud pointing down. The permanent drag link end goes to the bottom mounting hole of the bellcrank with the stud pointing away from the vehicle. Securely install the two castle nuts and torque them to 110 to 125 foot-pounds. Install the cotter pins and, again if the holes do not line up, tighten the castle nut.

(12) Rotate the clamping assemblies of the upper and lower drag links so they clear the vehicle chassis and moving parts. Torque the clamp nuts on both adjustable ends to 50 to 60 foot-pounds. Lubricate all four drag link ends.

(13) Replace the left front tire.

7. REPAIR OF THE TIE ROD ASSEMBLY

a. Inspection of the Tie Rod Assembly

(1) Check the dust seals on both tie rod ends for wear, cracks, or tears.

(2) Inspect the clamps, nuts, and capscrews for cracks, breaks, or damage.

(3) Check the tie rod itself for bends, breaks, cracks, or damaged threads.

(4) Look for damaged threads on the tie rod ends.

b. Removal of the Tie Rod End

(1) First, remove the cotter pin and castle nut from both sides of the tie rod.

(2) Now, using a tie rod remover and a hammer, remove the tie rod from each tie rod arm.

(3) Once the tie rod is removed, bring it out from under the truck for further disassembly.

(4) Now, remove the capscrew and locknut from the clamp at one end of the tie rod assembly at a time. The left tie rod end has left hand threads and the right hand tie rod has right threads.

(5) Count and record the number of turns as you remove the tie rod end.

c. Installation of the Tie Rod

(1) First, thread the tie rod ends into the tie rod, using the same number of turns as recorded during removal. Some threads of the tie rod end must extend beyond the slot in the tie rod.

(2) Now, install the capscrews and locknuts into the clamps and draw the locknuts up snug, but do not tighten at this time.

(3) Place the tie rod assembly under the front of truck. Make sure that the right hand threaded tie rod end is on the right side of the truck.

(4) Now, insert the tie rod ends into the tie rod arms and install the castle nut. Torque the castle nut to 125 foot-pounds and then continue to tighten until a new cotter pin can be inserted.

8. REPAIR OF THE PITMAN ARM

a. Inspection of the Pitman Arm

(1) First, inspect for any obvious cracks, breaks, or bends to the pitman arm.

(2) Make sure both locking setscrews, the capscrew, and plain washer securing the pitman arm to the power steering gear shaft are in place and tight.

(3) Check the drag link nut. If it is loose, it could cause an out-of-roundness condition in the drag link mounting hole of the pitman arm.

(4) Check the timing marks to make sure that the pitman arm was previously installed correctly.

b. Replacement of the Pitman Arm

(1) First, remove the capscrew, lockwasher, and flat washer from the steering output shaft.

(2) Next, remove the two locking setscrews from the pitman arm and, using a puller, remove the pitman arm from the steering shaft.

(3) When installing the pitman arm, align the timing mark on the steering gear output shaft with the timing mark on the pitman arm and rotate the pitman arm one notch clockwise and start the pitman arm onto the steering shaft.

(4) Using a 1 7/8 inch socket, a flat washer, and a capscrew 4 1/4 to 4 1/2 inches long, draw the pitman arm onto the steering shaft. Torque the capscrew to 85 foot-pounds.

(5) Remove the socket, flat washer, and installing capscrew.

(6) Coat the threads of the locking capscrew and setscrews with an anti-seize compound.

(7) Install the locking capscrew, lockwasher, and flat washer and torque the capscrew to 65 foot-pounds.

(8) Now install the two setscrews and torque them to 10 to 12 foot-pounds.

9. REPAIR BELLCRANK ASSEMBLY

a. Inspection of the Bellcrank

(1) Inspect the yaw bellcrank weldment for cracks, breaks, bends, or damage.

(2) Holding the yaw bellcrank at the top and bottom, check for play or wear in the bearing assemblies.

(3) Inspect the bearing cover and the bearing seal assembly for leakage, wear, or damage.

(4) The hex nuts securing the yaw control valve, upper drag link, and lower drag link should be tight. If any of the three nuts are found to be loose, check the tapered mounting hole(s) in the bellcrank for out-of-roundness.

(5) Check the bellcrank mounting bracket and capscrews for cracks, breaks, damage, or looseness.

(6) Grasp the drag link and check for excessive looseness at the socket assemblies.

b. Replacement of the Bellcrank

(1) It is necessary to have the yaw cylinder valve, upper drag link, and lower drag link disconnected from the bellcrank before removal of the bellcrank can be accomplished.

(2) Remove the four capscrews, lockwashers, and cover from the front of the bellcrank.

(3) Wipe the grease from the bellcrank opening and bend back the tabs on the lockwasher. Remove the two locknuts, lockwasher, and the torque washer from the bellcrank opening.

(4) After the removal of the locknut, you can now remove the outer bearing cone. Tag the bearing cone if you plan on installing it back in the bellcrank.

(5) Pull the bellcrank from the bracket and remove the seal and inner bearing cone from the bellcrank. Note the inner and outer bearings. Also, remove the lubrication fitting.

(6) From the rear of the bellcrank, tap the outer bearing cup out, if it is damaged. Turn the bellcrank over and tap the inner bearing cup out, if it is damaged. Place the bearing cups with their respective bearing cones.

(7) Remove the six capscrews and locknuts securing the bellcrank bracket to the frame. Clean the bellcrank bracket and inspect it for cracks, rust, wear or damage to the threads.

(8) Clean all the internal parts to the bellcrank assembly, and inspect them for cracks, breaks, rust, or wear.

(9) Tap the inner and outer bearing cups into place and repack the bearing cones. At this time, install just the inner bearing cone and the seal, with the lip of the seal facing the inner bearing cone.

(10) Install the lubrication fitting.

(11) Secure the bellcrank bracket to the frame with the six capscrews and locknuts and apply a light film of grease to the spindle to help prevent rust.

(12) Slide the bellcrank, with the inner bearing, onto the bellcrank bracket. While holding the bellcrank in position, slide the outer bearing cone into the bellcrank until it is seated in the outer bearing cup.

(13) Aline the torque washer tang with the slot on the bellcrank bracket, then install one locknut, with the beveled edge out. Tighten the locknut until the bellcrank movement becomes stiff and back off the locknut 1/3 of a turn.

(14) Place the tang washer over the bellcrank bracket, and install the second locknut, with the beveled edge out. Securely tighten the second locknut and bend one or two tabs of the tang washer over each locknut.

(15) Since no gasket is used, apply a light coat of silicone sealant to the cover and secure the cover to the bellcrank, with the four capscrews and lockwashers.

(16) Reinstall the yaw control valve, upper drag link, and lower drag link. Lubricate the bellcrank.

10. INSPECTION OF 90 DEGREE GEAR BOXES

a. Inspection of the Cab Mounted 90 Degree Gear Box. The cab mounted 90 degree gear box is on the left side, below the dash.

(1) Check the 90 degree gear box mounting bracket for cracks, breaks or looseness.

(2) Look for lubrication leakage around the shaft seals and the housing pipe plugs.

(3) Make sure the padlock bracket and the steering lock assembly are secure and in proper working order.

b. Inspection of the Frame Mounted 90 Degree Gear Box. The grille should be removed to allow better access to the frame mounted 90 degree gear box.

(1) Inspect the frame mounting bracket for cracks, breaks, or rust.

(2) Check the 90 degree gear box mounting capscrews and lockwashers for cracks, breaks or looseness.

(3) Look for lubrication leaking around the shaft seals and housing pipe plugs.

11. REPAIR OF THE YAW FEEDBACK LINKAGE

a. Inspection the Yaw Feedback Linkage

(1) Look for cracked, broken, or worn mounting capscrews, nuts, and lockwashers.

(2) Inspect the articulation joint lever, bellcrank, and pivot bracket for cracks, breaks, bends, or looseness.

(3) Next, check the socket assemblies, clamps, clamping capscrew, and nuts for cracks, breaks, or looseness.

(4) Now, inspect the socket assembly dust seals for cracks, tears, or damage. The drag link itself must be free of cracks, breaks, bends, or damage.

b. Removal of the Yaw Feedback Linkage

(1) First, the spring fuse link socket assembly must be removed from the yaw bellcrank and the wheels must be in the straight ahead position.

(2) Now, remove the cotter pins and castle nuts holding the socket assemblies in the yaw bellcrank and the lever assembly and remove the drag link from the bellcrank and lever assembly.

(3) Next, remove the mounting hardware and the lever assembly from the articulation joint.

(4) As you are removing the yaw bellcrank assembly, note the position of the flat washer. During installation, the correct positioning of this washer is necessary in order to provide enough clearance for the capscrew in the casting.

c. Repair of the Yaw Feedback Linkage

(1) Disassemble the yaw bellcrank assembly.

(a) First, place the pivot bracket into a soft-jawed vise so the hub cap is facing up.

(b) Carefully pry the hub cap off and remove the cotter pin, nut and flat washer from the pivot bracket shaft.

(c) Grasp the bellcrank arm and lift it off the pivot bracket.

(d) Now, remove the upper bearing cone from the top of the bellcrank and push the lower bearing cone and seal out the bottom of the bellcrank arm.

(e) If you are replacing the bearing cones or if the bearing cups are damaged or worn, then the bearing cups must be replaced.

(2) Repair the drag link.

(a) If it was determined during inspection that the socket assemblies were loose, then they need to be replaced.

(b) To replace the socket assemblies, remove the locking capscrews and nuts from the clamps.

(c) Now, turn the socket assemblies out of the drag link. The lever socket assembly has left hand threads and the bellcrank socket assembly has right hand threads.

(d) After you replace the defective sockets, thread the new sockets back into the drag link. Thread them in evenly until the distance between the centers of the sockets is 20 inches.

(e) Once you have the correct distance, install the locking capscrews and nuts onto the clamp. Do not tighten the capscrews.

(3) After replacing the socket assemblies, the yaw bellcrank needs to be assembled.

(a) First, repack the bearing cones with clean grease.

(b) If the bearing cups were removed, you should install new ones at this time.

(c) Now, slide the lower bearing cone into the bottom of the bellcrank arm. Install the seal so the spring side is towards the bearing cone.

(d) Turn the bellcrank arm over and place the upper bearing in the bellcrank arm.

(e) Slide the bellcrank onto the pivot bracket and install the washer and castle nut. Torque the castle nut to 100 inch-pounds and then continued to tighten the nut until the cotter pin slots are alined with the hole. Never back off the nut to aline the slots because it might cause an early failure of the bearings.

(f) Once the nut is properly torqued, tap the bellcrank with a soft-faced hammer to seat the bearing cones. Make sure the bellcrank turns freely.

(g) The last step is to install a new cotter pin and cover it with the hub cap.

d. Replacement of the Yaw Feedback Linkage

(1) When reinstalling the pivot bracket onto the frame, make sure the flat washer is installed in its correct location.

(2) Now, install the lever assembly onto the articulation joint.

(3) Insert the drag link so the left hand threaded socket assembly fits into the lever assembly. The right handed socket goes into the yaw bellcrank assembly.

(4) Install the castle nuts, torquing them to 17-25 foot-pounds and continue to tighten until the cotter pin slots are alined.

(5) Once the slots are alined, install the new cotter pins.

(6) The last step is to install the spring fuse link back into the yaw bellcrank slot.

(7) If any parts were replaced or if the vehicle was moved during the repair procedures, the articulation joint alinement must be checked. We will cover this alinement procedure a little later.

12. REPAIR THE SPRING FUSE LINK ASSEMBLY

a. Inspection of the Fuse Link Assembly

(1) The cover plate should be tight within the yaw control valve and securely tightened to the fuse link housing with four socket head capscrews and locknuts.

(2) Check the fuse link housing for cracks, breaks, damage, or lubrication leaks. Also, check the lubrication fitting for damage.

(3) The boot should be secured at both ends with hose clamps and it should be free of cracks, tears, or damage.

(4) Inspect the exposed portion of the rod assembly and the socket clamp assembly for cracks, breaks, or damage.

(5) Make sure the socket assembly is secure within the fuse link rod assembly and the yaw bellcrank. Check the socket assembly end dust shield for cracks, tears, or damage.

b. Removal of the Fuse Link Assembly

(1) Remove the cotter pin and castle nut from the socket assembly and remove the socket assembly from the yaw bellcrank.

(2) Now, remove the capscrew and locknut from the yaw control valve and turn the fuse link assembly out of the valve.

c. Repair of the Fuse Link Assembly

(1) First, remove the capscrew and nut from the clamp. Unscrew the socket assembly from the fuse link rod and slide the clamp off the end of the rod.

(2) Next, loosen the two hose clamps and slide the boot off the housing and fuse link rod. Remove the lubrication fitting from the housing.

(3) Now, secure the fuse link housing in a vise. Remove the four socket head capscrews, locknuts, and cover from the fuse link housing. Also slide the fuse link spacer out from inside of the housing.

(4) Move to the other end of the housing and remove the setscrew and pellet from the adjusting collar. Then, have an assistant pull the fuse link rod to compress the spring. While the spring is compressed, turn the adjusting collar off the fuse link. Slowly release the fuse link rod to ease the spring tension and remove the adjusting collar from the fuse link rod. Do not stand in front of the cover end of the housing when you are releasing the fuse link rod.

(5) Slide the fuse link rod, spring and spring cap out of the housing. Separate the spring caps and spring from the fuse link rod.

(6) Now, insert the fuse link rod back into the fuse link housing and through the cap. Thread the adjusting collar back onto the fuse link rod.

(7) Using the fuse link rod as a slide hammer, loosen the cap from the housing. After the cap is loose, remove the cap, rod, and adjusting collar from the housing.

(8) Slide the cap off the rod and remove the adjusting collar.

(9) If the lubrication fitting is damaged, remove it.

(10) Carefully inspect all the internal parts for cracks, breaks, rust, pitting, or wear.

(11) To assemble the fuse link, insert the cap, spring, and spring cap onto the fuse link rod.

(12) Coat the inside of the fuse link housing with a thin coat of grease and insert the fuse link rod into the housing so the cap end of the rod goes through the cover end first.

(13) Slide the adjusting collar onto the fuse link rod.

(14) With an assistant pulling on the fuse link rod to compress the spring, start the adjusting collar onto the rod. After you know the adjusting collar will hold the rod spring tension, slowly release the fuse link rod.

(15) Insert the spacer into the housing and apply sealant to the mating surfaces of the fuse link housing and the cover. Position the cover so that the flat on the threads is in the same direction as the lubricant fitting hole on the housing. Secure the cover with the four socket head capscrews and locknuts.

(16) Turn the adjusting collar until all end play is removed from the fuse link rod. When this is accomplished, install the pellet into the setscrew opening and secure the collar with the setscrew.

(17) Slide the boot over the fuse link rod and housing and secure the boot with the large and small hose clamps.

(18) Place the fuse link rod clamp over the fuse link rod. Fill the slotted end of the fuse link rod with silicone sealant and turn the socket assembly into the fuse link rod. Install the clamp capscrew and nut but do not tighten at this time.

(19) Install the lubrication fitting into the fuse link housing and lubricate the fuse link assembly following the vehicle's lubrication order.

d. Replacement of the Fuse Link Assembly

(1) Turn the threads of the fuse link cover into the yaw control valve as far as possible. Now, aline the flat of the threads to face the yaw control valve locking capscrew.

(2) Next, install and tightly secure the locking capscrew and locknut in the yaw control valve.

(3) Turn the socket assembly either in or out to aline it with the mounting hole in the yaw bellcrank. Insert the socket and install the castle

nut and torque the nut to 17 to 25 foot-pounds. Install a new cotter pin; if the hole does not align tighten the castle nut until alignment is attained.

(4) After the socket is installed, tighten the clamp cap screw securely.

13. INSPECTION OF THE STEERING GEAR ASSEMBLY

- a. Check for leaking seals at the steering gear input and output shafts.
- b. Inspect the power steering hoses and fittings for cracks, breaks, looseness, or leaks.
- c. Check the power steering gear mounting cap screws and safety wire for breaks, cracks, or looseness.
- d. Look for cracks, breaks, bends, or damage to the mounting bracket.

14. REPAIR OF THE YAW CONTROL VALVE

a. Inspection of the Yaw Control Valve

- (1) Look for leaking gaskets or seals.
- (2) Check the control valve mounting at the bellcrank and fuse link assembly for tightness, cracks, breaks, or damage.
- (3) Inspect all hoses and connections for cracks, breaks, looseness, damage or leaks.

b. Removal of the Yaw Control Valve

- (1) Start by placing the wheels in the straight ahead position and block the front and rear tires. Next, we'll begin removing the fuse link assembly.
- (2) Now, tag the hydraulic lines for proper installation and remove and plug the ends of the lines.
- (3) Remove the cotter pin and castle nut from the ball stud. Detach the yaw control valve from the bellcrank and remove it from the vehicle.
- (4) Turn out the three nipples and one elbow from the yaw control valve, if they are damaged.

c. Replacement of the Yaw Control Valve

(1) Reinstall the elbow and three nipples securely into their proper locations on the yaw control valve, if they were removed.

(2) From the chassis side, install the yaw control valve into the bellcrank. Secure it with the castle nut and torque it to 185 to 200 foot-pounds and install a new cotter pin through the castle nut and ball stud. If the holes do not align, tighten the castle nut until they do.

(3) Install the fuse link assembly back into the yaw control valve.

(4) Secure the four hydraulic lines to the proper fittings on the control valve.

(5) If any hydraulic fluid was lost, it must be replaced.

15. REPAIR OF THE YAW CYLINDER

a. Inspection of the Yaw Cylinder

(1) Check for looseness, binding, rust or worn yaw cylinder pins and bushings.

(2) Hoses and fittings should be free of cracks, breaks, and looseness. Also look for worn hoses where movement occurs.

(3) Inspect the yaw cylinder piston for scratches, nicks, and leakage around the seal area.

b. Removal of the Yaw Cylinders. Both the left and right yaw cylinders are removed in the same manner.

(1) It is necessary to install the locking strut before removing one or both yaw cylinders. This is to prevent the articulation joint from accidentally swinging.

(2) Tag the hydraulic lines for identification during installation. Now, remove and plug the two hydraulic lines from the yaw cylinder.

(3) Next, remove the two cotter pins, castle nuts, washers, and threaded pins from both ends of the yaw cylinder.

(4) Pull the cylinder from the vehicle. Note their locations and turn out one nipple, plug and elbow. If damaged, remove two lubrication fittings; one in the piston, and one in the cylinder.

(5) If necessary, remove the four bushings from the yaw cylinder mounting brackets on the vehicle.

c. Replacement of the Yaw Cylinder

(1) If removed, install the four bushings into the yaw cylinder mounting brackets.

(2) Now, install the nipple, plug, and elbow in their proper locations on the cylinder. Also, install the lubrication fittings.

(3) Next, extend the cylinder piston to the proper length and install the yaw cylinder on the vehicle. Slide the threaded pins through the yaw cylinder brackets and cylinder at both ends.

(4) To secure the cylinder, insert the threaded pins with plain washers, castle nuts, and cotter pins.

(5) Attach the two hydraulic lines and lubricate both ends of the yaw cylinder mountings.

(6) The last step is to remove and stow the locking strut.

16. ADJUST THE STEERING SYSTEM

a. Preliminary Setup

(1) Before the steering adjustments are made, inflate the tires to their proper pressure.

(2) Trailers are to be separated from the MK48. Use caution when working on or moving a separated MK48 because it is extremely front heavy.

(3) Perform all adjustments on a hard, flat, level surface.

b. Toe-In Adjustment

(1) Raise the number 1 axle, lifting the front tires just off the ground.

(2) Now, scribe a straight, vertical line all the way around the tread at the center of each tire.

(3) After making the scribe mark, lower the axle until the tires are completely on the ground.

(4) Now, at a point 12 inches from the ground, measure the distance between the vertical lines at the front of the tires. Also at 12 inches off the ground, measure the distance between the vertical lines at the rear of the tires. The front measurement should be 1/8 of an inch less than the rear. If distance is incorrect, then you must adjust the tie rod to obtain the correct measurements.

(a) To adjust the toe-in, raise the number 1 axle until the tires clear the ground.

(b) Now, loosen the capscrews and nuts securing the two tie rod end clamps.

(c) Turn the tie rod tube in the direction as shown on the transparency, depending if you want to increase or decrease the toe-in measurement.

(d) After making your adjustment, recheck the distance between the vertical lines. Once the adjustment is correct, torque the two clamping capscrews and locknuts to 50 to 60 foot-pounds.

c. Adjustment of the Cramp Angle

(1) Make sure the front wheels are straight by measuring the space between the axle ball flange and the trunnion housing. The measurement should be equal on both sides.

(2) Once you know the vehicle is straight ahead, insert the cramp angle adjusting tool between the axle stop capscrew and the ball socket. The notched end of the tool must be squarely seated on the edge of the ball socket flange. There should be an interference fit between the tool and the axle stop capscrew and the ball socket housing. "In other words, it should fit into place with a slight drag."

(3) If the tool is loose or will not fit, loosen the jam nut and adjust the stop capscrew accordingly. When the proper fit is reached, tighten the jam nut.

(4) Repeat the steps for the other side of the axle.

d. Number One Axle Alinement. To ensure the accuracy of your measurements, move the vehicle forward and backward in a straight line approximately 30 feet. This will remove any twist or flex in the frame rails and wheel and tire assemblies.

(1) Make sure the front wheels are straight by measuring the space between the axle ball flange and trunnion housing. The measurement should be equal on both sides.

(2) Using the front crossmember as an anchor point, drop two plumb bobs to the floor. Both plumb bobs must hang from the front of the crossmember and should be as close to the frame rails as possible.

(3) Making sure the plumb bobs do not move, mark the floor directly under the point of each plumb bob with chalk.

(4) Extend a chalk line across the two plumb bob chalk marks and beyond both front wheels. Pull the chalk line tight and snap it against the floor.

(5) Now, locate the center of the number 1 axle end caps by drawing a line across the center of the two opposite axle studs. It may be necessary to place a piece of tape over the middle of the end cap. Draw a minimum of three different lines. The point where the lines cross is the center of the axle.

(6) Position a square against the wheel. With one edge flat on the floor and the vertical outer edge of the square at the center of the axle, mark the point where the vertical outer edge meets the floor.

(7) Repeat the preceding two steps for the other end cap.

(8) Using the square as a guide on the floor, measure the chalk line rearward along the outside of the tire to the center of the axle mark. The measurement for both right and left sides should be equal, plus or minus 1/16 of an inch.

(9) If repositioning of the number 1 axle is needed, the adjustment is accomplished by performing the following procedures.

(a) Remove the two nuts, four washers and two capscrews securing the lower torque rod to the axle.

(b) Move the axle forward or backwards by adding or removing the hardened washers between the torque rod and the axle.

(c) When the measurement from the chalk line to the axle center is equal on both sides, install the two capscrews, four washers, and two nuts. Torque the nuts to 170 foot-pounds.

e. Number Two Axle Alinement. It is necessary to first aline the number 1 axle before alining the number 2 axle. Continue the number 2 axle alinement procedure by using the same existing plumb bob line forward of the front axle.

(1) Locate the centers of both the number 2 axle shafts and project the center points down to the floor using the same method as on the number 1 axle.

(2) Using the square as a guide, measure from the forward chalk line rearward to the center mark of the number 2 axle. The measurement for both the right and left sides should be equal, plus or minus 1/16 of an inch.

(3) If repositioning of the number 2 axle is needed, the adjustment procedure is the same as the number 1 axle. Be sure to torque the mounting capscrews and nuts to 170 foot-pounds when proper alinement is reached.

f. Articulation Joint Alinement. If the vehicle has been moved after the alinement of the number 1 and 2 axles, or just the articulation joint is to be alined, the front chalk line is needed for the articulation joint alinement.

(1) After the vehicle has been positioned and the forward chalk line in place, disconnect the right and left yaw cylinders at the articulation joint.

(2) Remove the cotter pin and nut from the yaw feedback linkage at the articulation joint bracket. Disconnect the yaw feedback linkage from the articulation joint bracket.

(3) Using the articulation joint to trailer mating surface, drop two plumb bobs close to the outside edges to the floor.

(4) Mark the floor directly under the point of each plumb bob with chalk. Stretch and snap a chalk line across the two rear chalk marks extending beyond the right and left tires.

(5) Using the square as a guide, measure from the forward chalk line along the outside of the tires to the rear chalk line. Measure both sides of the vehicle.

(6) If the right side and left side measurements are different, manually rotate the articulation joint. It will be necessary to snap a new rear chalk line each time the articulation joint is moved and remeasured.

(7) Once the articulation joint is alined, loosen the two locknuts and capscrews on the yaw feedback linkage. Adjust the linkage until it will drop into the articulation joint bracket. Install the castle nut and cotter pin securing the linkage to the bracket. Tighten the two linkage clamping capscrews and nuts.

(8) After the adjustment is correct, connect the yaw cylinders to the articulation joint.

16. ADJUST THE STEERING SYSTEM (contd)

g. Pitman Arm Adjustment

(1) Raise the number 1 axle until the tires are off the ground. Pull the selector valve to the auxiliary hydraulics position. The selector valve is placed in the auxiliary hydraulics position as a safety measure to prevent movement of the articulation joint when the steering wheel is turned while the front tires are raised off the ground.

(2) Turn the steering wheel slowly all the way to the right until the axle stop capscrew contacts the ball socket.

(3) Loosen the front pitman arm stop capscrew jam nut and turn the stop capscrew so that it contacts the front of the pitman arm at the same time as the axle stop contacts the ball socket.

(4) Slowly turn the steering wheel to the left. Using the same adjustment procedure as the front stop capscrew, adjust the rear stop capscrew.

h. Steering Gear Relief Adjustment. When setting the steering gear reliefs, do not hold the steering wheel against the stops for more than 15 seconds at a time. Prolonged operation at system relief will cause damage to the hydraulic system.

(1) Raise the number 1 axle until the tires just clear the ground.

(2) Install a high pressure hydraulic gage at the number three test port on the pressure relief valve. The pressure gage must be capable of handling up to 2,000 pounds per square inch of pressure. Pull the selector valve to the auxiliary hydraulics position. Again, this is a safety measure.

(3) Start the engine, engage the parking brake, place the transmission in neutral and allow the hydraulic system to reach normal operating temperature.

(4) Turn the front and rear steering gear reliefs out approximately two turns. The pressure reading could go as high as 1750 pounds per square inch.

(5) Insert a 1/8 inch (3.1mm) shim between the left axle stop cap-screw and the ball socket. Have an assistant slowly turn the steering wheel to the left until the shim is in contact with the axle stop and the ball socket. While the assistant holds the steering wheel in this position, turn the rear steering gear relief in until a pressure reading of 700 pounds per square inch is reached.

(6) After setting the rear relief, insert the 1/8 inch shim between the right axle stop cap screw and the ball socket. Have an assistant slowly turn the steering wheel to the right until the shim is in contact with both the axle stop cap screw and the ball socket. While holding the steering wheel, adjust the front steering gear relief until a pressure reading of 700 pounds per square inch is reached.

(7) Once the steering gear reliefs have been set, shut down the engine and remove the pressure gage.

i. Number Three and Four Axle Alinement on Uncoupled Units. On a hard, flat level surface, raise and lower the number 3 and number 4 axles to eliminate suspension twist. Level the rear unit before taking measurements or making adjustments.

(1) Using the rear body to articulation joint mating surface, drop two plumb bobs close to the outside edges to the floor.

(2) Mark the floor directly under the point of each plumb bob with chalk. Stretch and snap a chalk line across the two chalk marks extending beyond the right and left tires.

(3) Place a piece of tape over the middle of each axle shaft. Mark the center of each shaft on the masking tape. Using a square, transfer the mark to the floor.

(4) Next, measure from the chalk line to the center of the number 3 axle on both sides. The measurement should be equal, plus or minus 1/16 of an inch.

(5) Check the alinement of the number 4 axle, measuring from the forward chalk line to the axle center. Both sides should be equal, plus or minus 1/16 of an inch.

(6) The number 3 and 4 axles are alined using the same methods as the number 1 and 2 axles, which is to add or remove the washers at the torque rods.

j. Alinement of the Number Three and Four Axles on Coupled Units

(1) Pull the selector valve into the auxiliary hydraulics position.

(2) Remove the cotter pin and castle nut from the yaw feedback linkage at the articulation joint bracket. Disconnect the feedback linkage from the bracket.

(3) Start the engine and drive the vehicle straight ahead 40 to 50 feet on a hard flat surface.

(4) Measure the distance between the center of the number 1 axle end cap and the center of the number 2 axle shaft on both the right and left sides. The measurement should be the same, plus or minus 1/16 of an inch. If it is not, it will be necessary to aline either or both the number 1 and 2 axles.

(5) Measure the distance between the center of the number 1 axle end cap and the center of the number 2 axle shaft on both the right and left sides. The measurement should be the same, plus or minus 1/16 of an inch. If it is not, it will be necessary to aline either or both the number 1 and 2 axles.

(6) Measure the distance between the centers of the number 3 and 4 axle shafts on both sides. The measurement should be the same, plus or minus 1/16 of an inch. If not, it will be necessary to aline the number 4 axle.

(7) Drive forward 40 to 50 feet. Adjust the yaw feedback linkage so that it will drop into the lever. Secure the feedback linkage with the castle nut and cotter pin.

(8) Push the selector valve in and road test the vehicle, driving at least a couple of miles. Stop on a flat section of road and disconnect the yaw feedback linkage at the bracket. Pull the vehicle straight ahead for 100 feet and readjust the yaw feedback linkage, if it is necessary, so it will drop into the bracket. Secure the yaw feedback linkage with castle nut and cotter pin.

17. DIAGNOSE MK48 STEERING SYSTEM MALFUNCTIONS

a. General

(1) The transparency that you see on the screen lists the malfunctions that we will cover.

(2) What I want you to do is tell me how to diagnose each of the malfunctions. The required information is in your technical manual, and that is where you will find the answers to the questions I will ask.

(3) Simultaneous testing of an entire steering system for a malfunction would be nearly impossible. Therefore, the TM directs us to systematically perform a series of tests or inspections to determine the serviceability of individual components within the system during malfunction diagnosis.

b. Malfunction No. 1 (Vehicle steers hard in one or both directions)

(1) Check the tire pressure.

(a) If the tire pressure is not correct, service the tires.

(b) If the tire pressure is correct, check the selector valve.

(2) Make sure the selector valve is in.

(a) If the selector valve is not in, push the valve in.

(b) If the selector valve is in, check the hydraulic oil.

(3) Check the hydraulic oil for the correct oil level and type.
Refer to LI 2320-12/9.

(a) If it's wrong, change the level or oil as needed.

(b) If it's correct, check for oil leaks.

(4) Check for hydraulic leaks and damaged lines that may cause oil flow restrictions.

(a) If oil leaks or damaged lines are found, repair as needed.

(b) If no oil leak or damage is found, check for binding steering components.

(5) Disconnect the steering linkage from the input side of the steering gear. Turn the steering wheel in both directions and check for binding in the column or the 90 degree gear boxes.

- (a) If binding or damage is found, repair or replace as needed.
 - (b) If no binding is found, check the tie rod.
- (6) Check for binding or damage to the tie rod on the front axle.
 - (a) If binding or damage is found, repair or replace as needed.
 - (b) If no binding or damage is found, check the ball and socket assemblies.
- (7) Check the front axle ball and socket assemblies for binding or damage.
 - (a) If binding or damage is found, send the vehicle to intermediate, third echelon maintenance.
 - (b) If no binding or damage is found, check the bellcrank.
- (8) Check the bellcrank, pitman arm, and drag links for binding or damage.
 - (a) If binding or damage is found, repair or replace as needed.
 - (b) If no binding or damage is found, check the power steering gear.
- (9) Check the power steering gear for looseness or damage.
 - (a) If the power steering gear is loose or damaged, send the vehicle to intermediate, third echelon maintenance.
 - (b) If the power steering gear is not loose or damaged, check the yaw control valve.
- (10) Check the yaw control valve and yaw cylinders for damage.
 - (a) If the yaw control valve is damaged, replace as needed.
 - (b) If no damage is found, check the fuse link.
- (11) Check the fuse link for looseness or damage.
 - (a) If the fuse link is loose or damaged, repair or replace as needed.

(b) If the fuse link is not loose or damaged, check the articulation joint.

(12) Check the articulation joint for damage.

(a) If the articulation joint is damaged, send the vehicle to intermediate, third echelon maintenance.

(b) If no damage is found, check the steering alinement.

(13) Check the steering and front alinement.

(a) If the steering and front alinement are correct, send the vehicle to intermediate, third echelon maintenance.

(b) If the steering and front alinement are not correct, correct the front alinement.

REFERENCES:

TM 2320-20/12A

TM 2320-34/13A